

ABSTRACT

A communication system capable of employing polarization-dependent phase modulators with a reversing configuration that preserves security against disturbance of a polarization state at a transmission path but without using Faraday mirrors and a communication method using the same are provided.

A quantum cryptography system of the present invention includes a first station 1, a transmission path 2, and a second station 3. The first station 1 has means for emitting time-divided optical pulses into the transmission path 2 and measuring a phase difference between the optical pulses returning from the transmission path 2. The transmission path 2 is a medium of light. The second station 3 has means for reversing traveling directions of the optical pulses, means for producing a phase difference, corresponding to a random number bit value to be transmitted, between the time-divided optical pulses, means for splitting the entering optical pulse into orthogonally polarized components and producing a 180-degree phase difference therebetween, means for rotating each polarization direction by 90 degrees, means for eliminating a component resulting from a deviation from the polarization rotation angle of 90 degrees, and means for attenuating optical pulse intensity to include no more than 1 photon per bit.